JÜLICH
FORSCHUNGSZENTRUM

Large-scale experiments in BaGiGo Project

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Research Centre Jülich

Outlook

- BaSiGo Project: Introduction
- Experiments
  - Impressions and general details
  - Camera technique
  - Day 1
  - Day 2
  - Day 3
- Outlook

BaSiGo project

- Safety and security modules for major events
- Government-funded project (BMBF)
- Funding period: 2012-2015
- 10 Cooperation-partners (universities, fire brigade, police, companies, …)

- Goal: Provide tools to support the organization of big events.

- Research Centre Jülich
  - Experiments with up to 1000 participants
  - How do jams appear in crowd?
  - When do jams become dangerous?
  - What is the influence of perception on the dynamics?
  - How important are social structures in a crowd?
  - **Modeling and simulation of jam-waves**

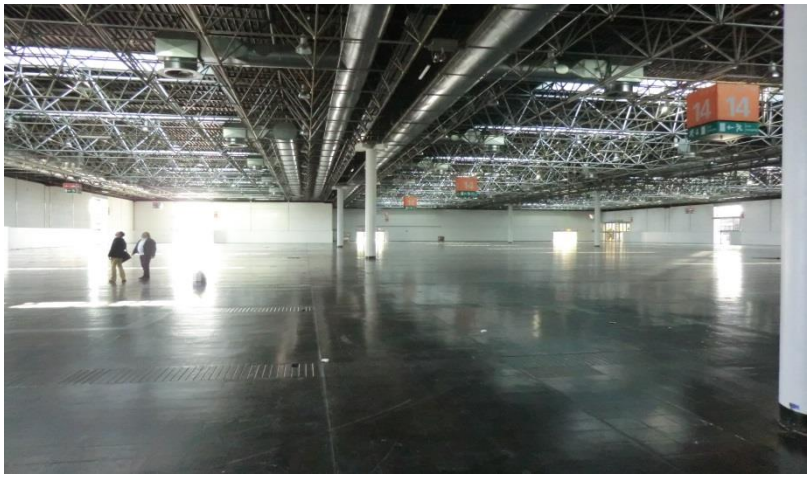
GEFÖRDERT VOM

Bundesministerium
für Bildung
und Forschung

EXPERIMENTS

Organizers

- Messe Düsseldorf,
  17. bis 22. June 2013
- Organization and support
  - Forschungszentrum Jülich
  - University of Siegen
  - University of Wuppertal
  - University of Essex



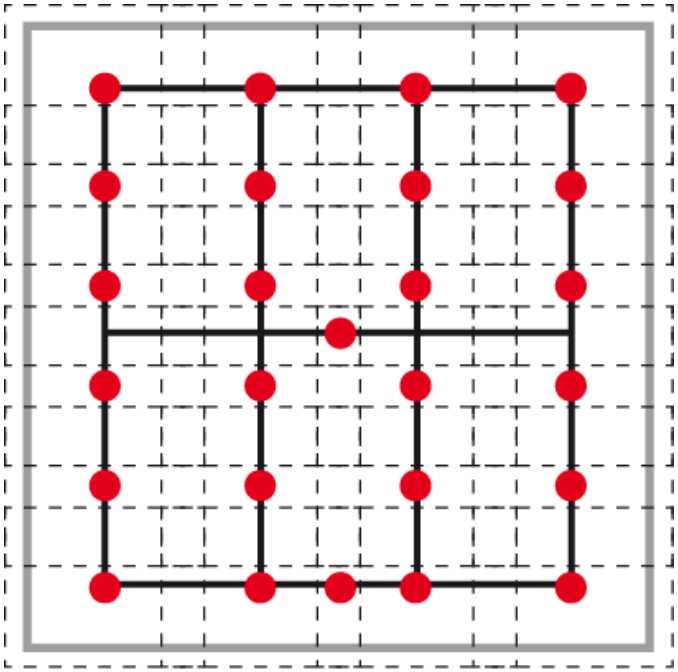
Participants

- Participants and helper
  - Tag 1: approx. 350
  - Tag 2: approx. 620
  - Tag 3: approx. 140
  - Tag 4: approx. 950

Camera installation

- Video and Audio technique
  - Grid of 24 industry cameras
  - HD-Cameras
  - Camera glasses
  - Audio-Recording
  - Separate lighting

- Hight: 8 m

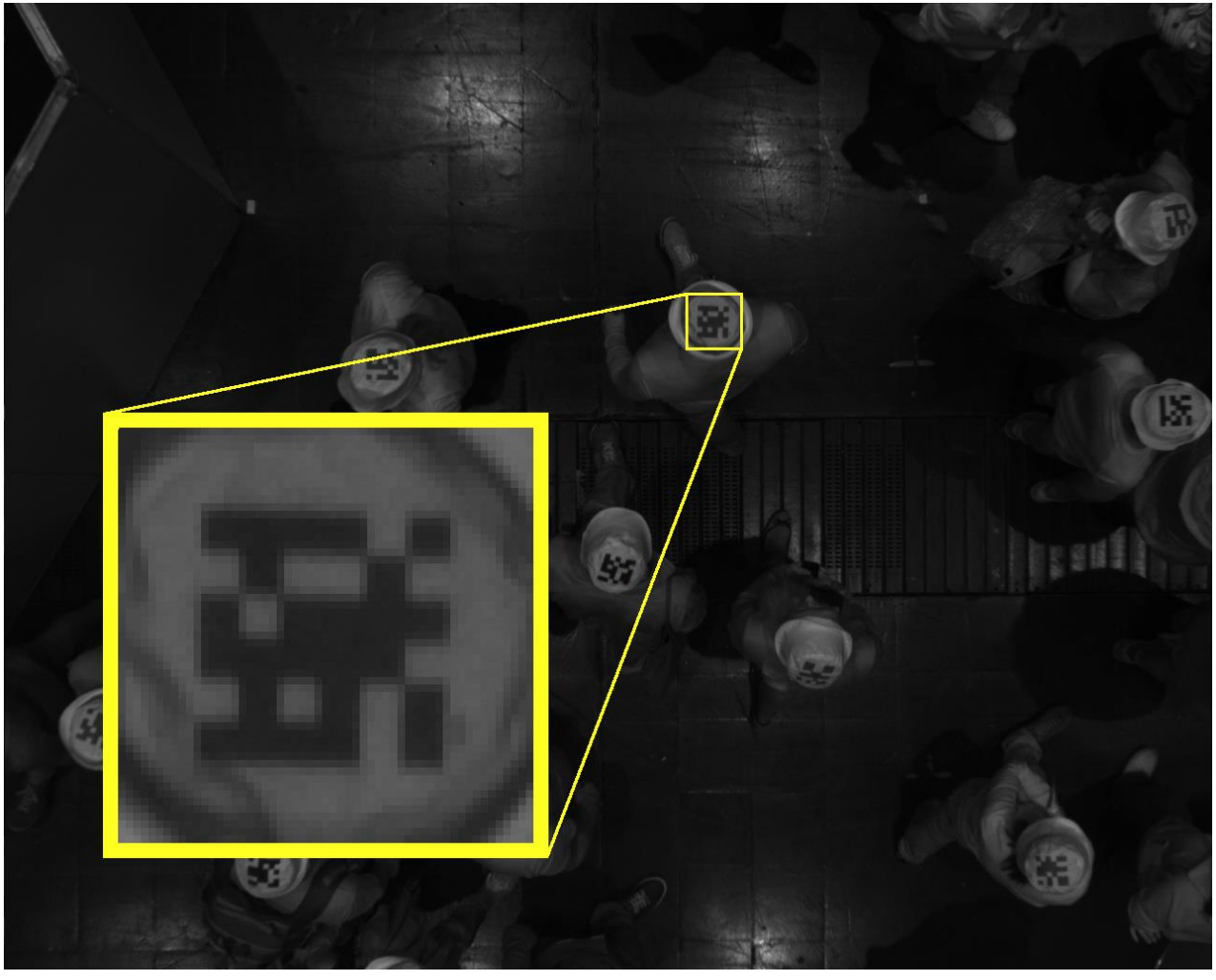


Markers QR-like

- Individual Markers
- Height 8 m

Markers QR-like

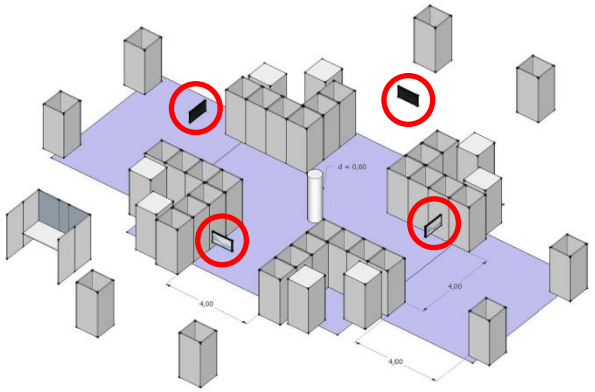
- Individual Markers
- 36x36 Pixels

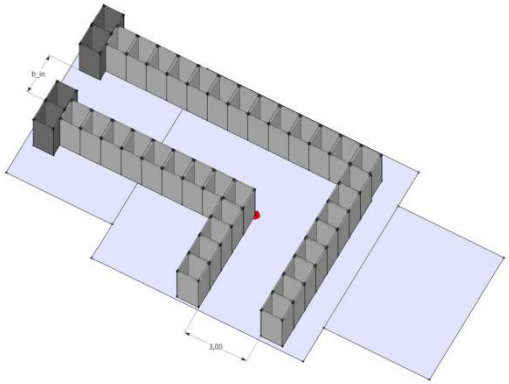


DAY 1

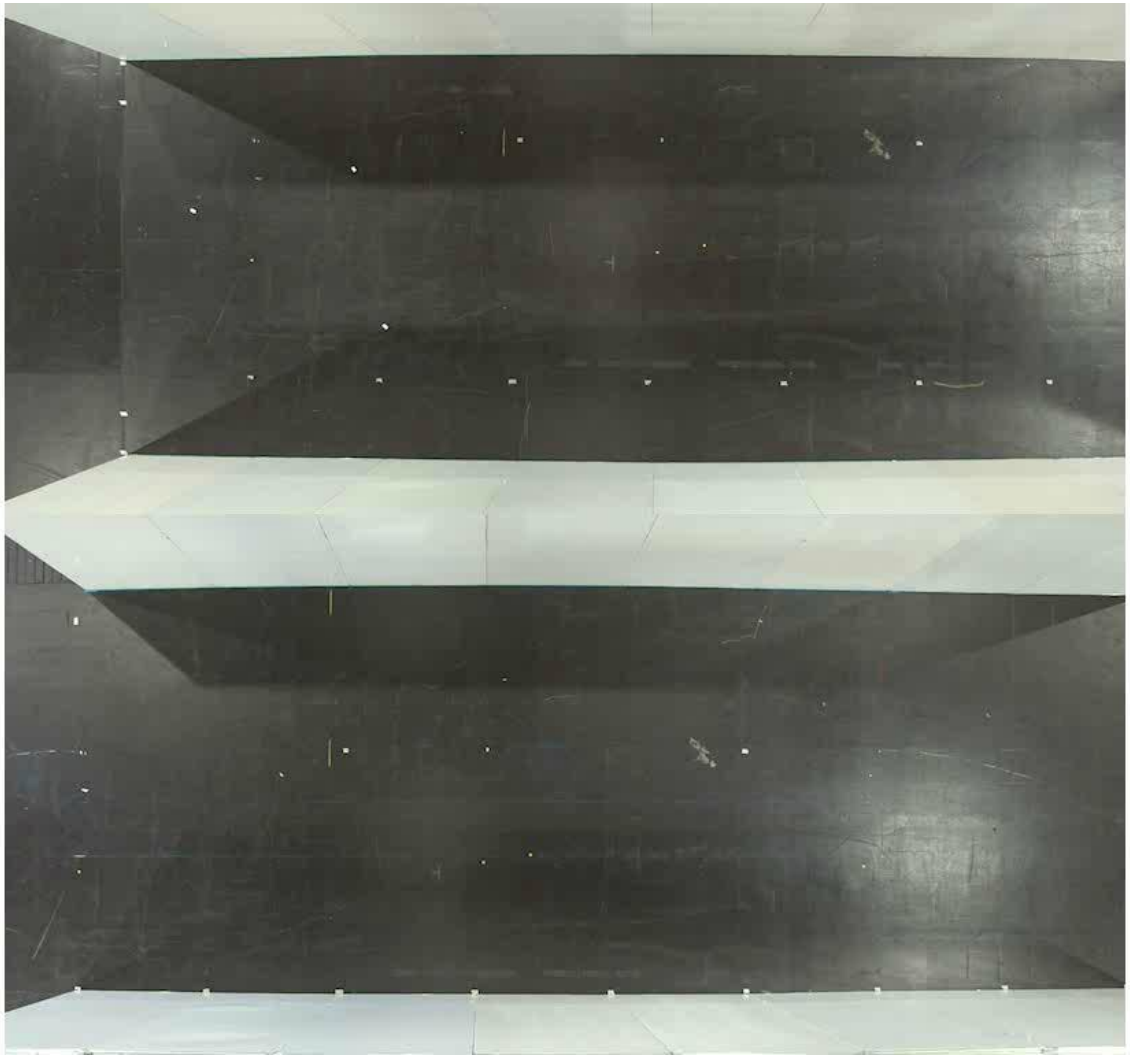
Day 1

- SOLO_REF
  - Measurement of the free-flow speed.
- CROSSING_90
  - Without pillar, without information signs
  - Without pillar, with information signs
  - With pillar, with information signs
  - Crossing with 2/4 entrances
- UNI_CORNER_300
  - Unidirectional flow in corners

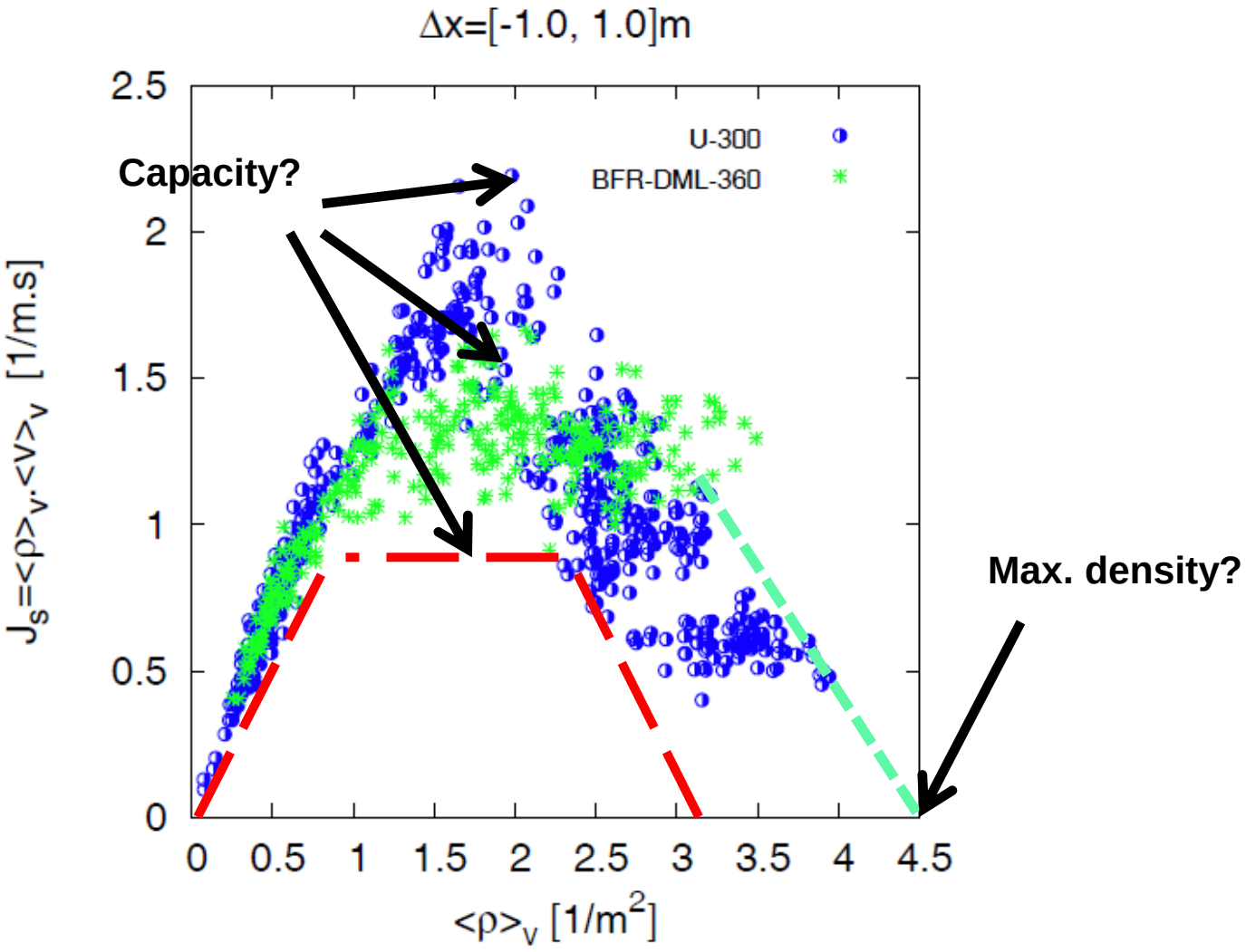




Bidirectional flow (2009)

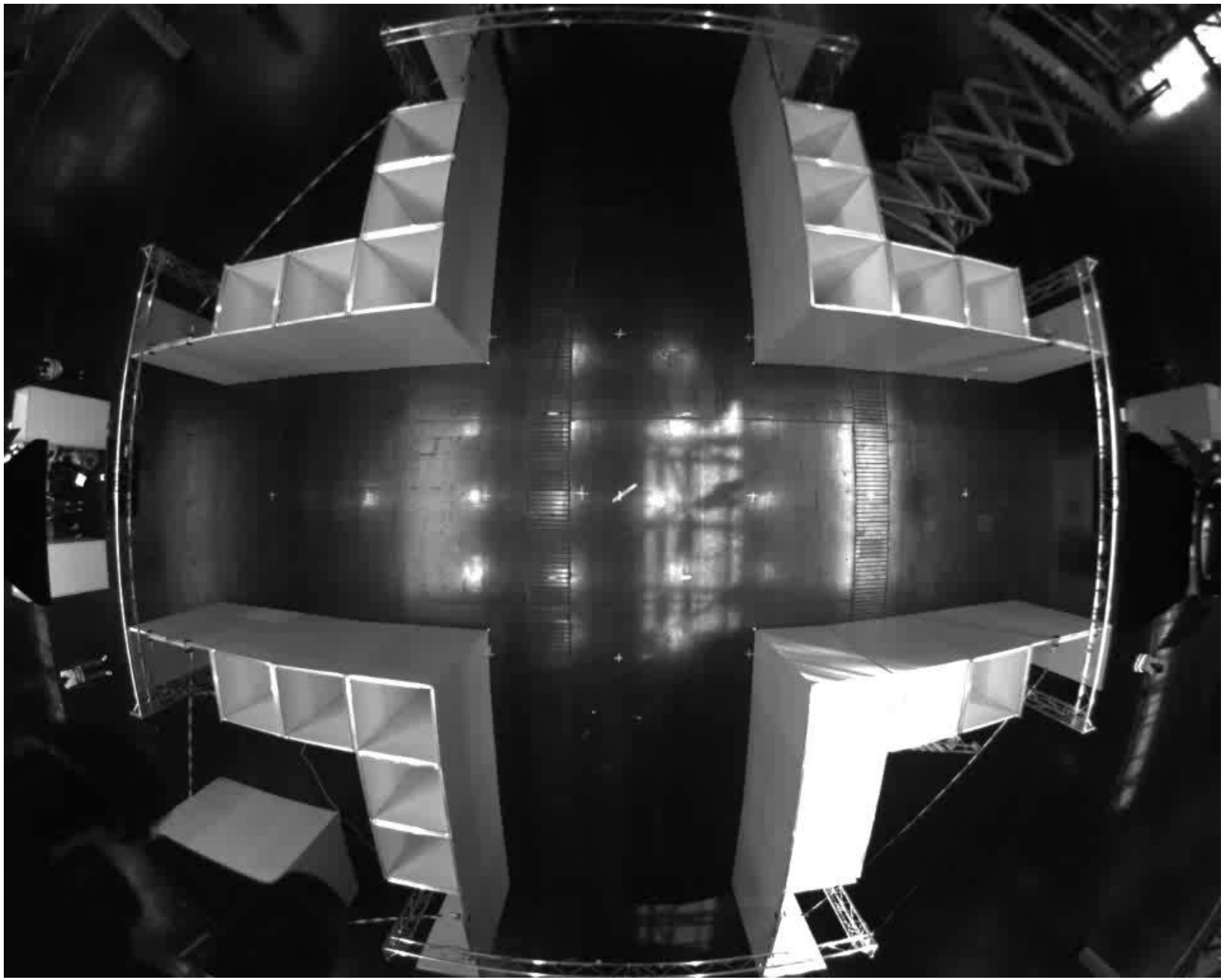


Bidirectional flow (fundamental diagram)

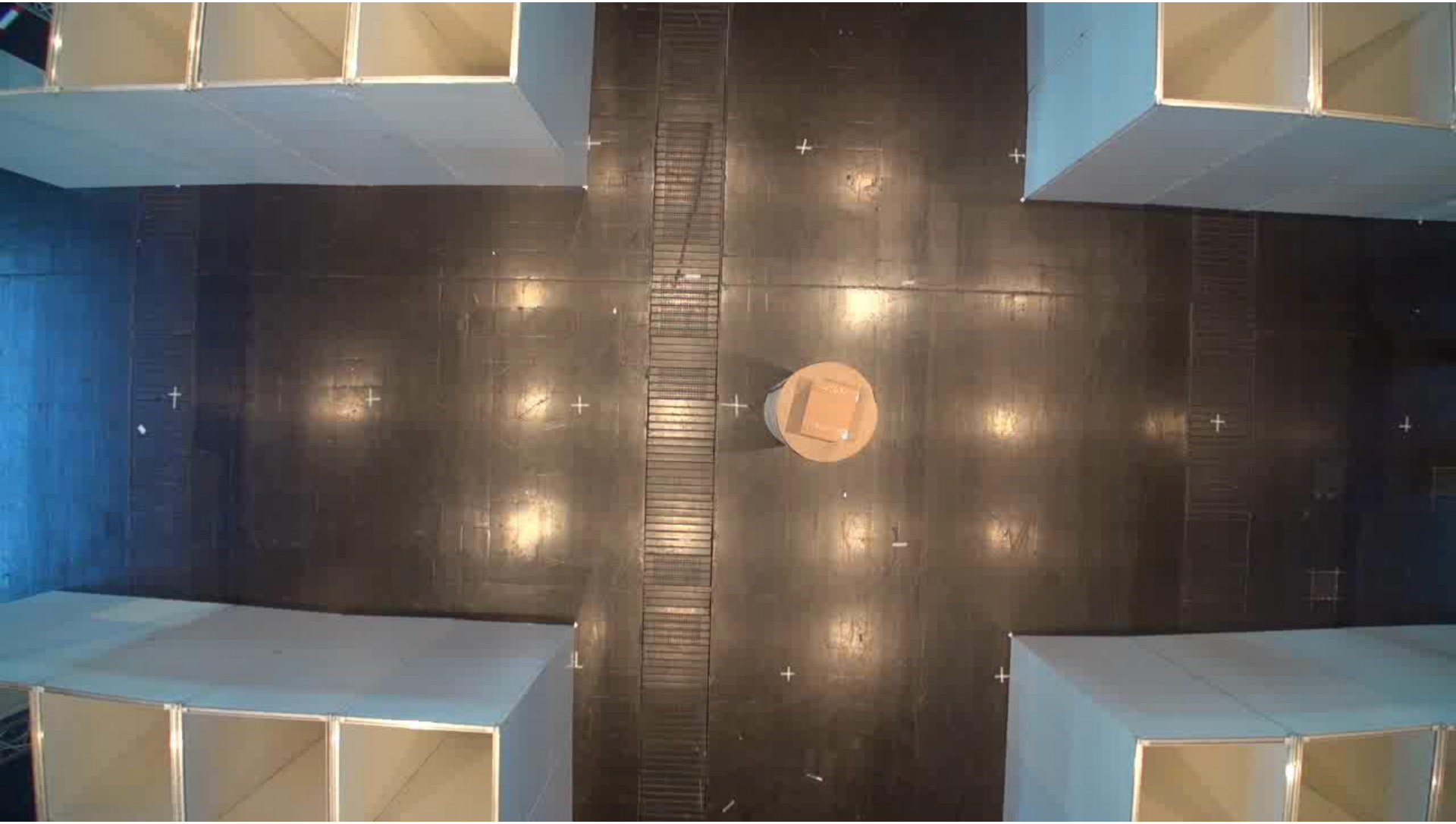


Crossing without pillar & without information signs

Crossing without pillar & without information signs



Crossing with pillar & with information signs



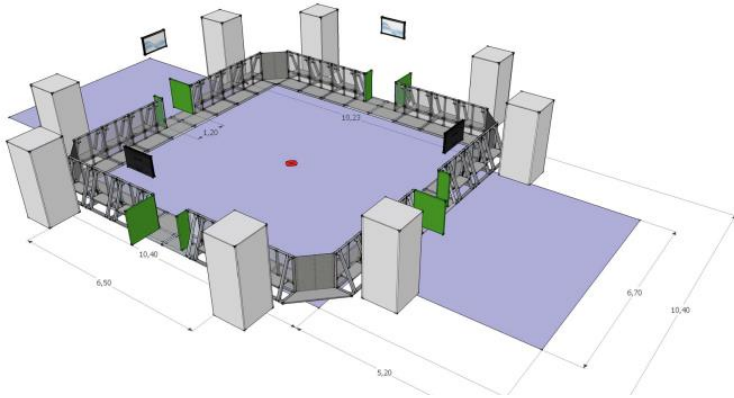
Crossing with pillar & with information signs

DAY 2

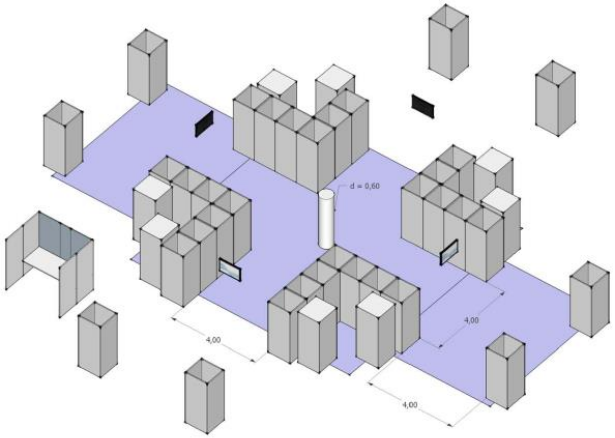
Day 2

- SOLO_REF
  - Measurement of the free-flow speed.

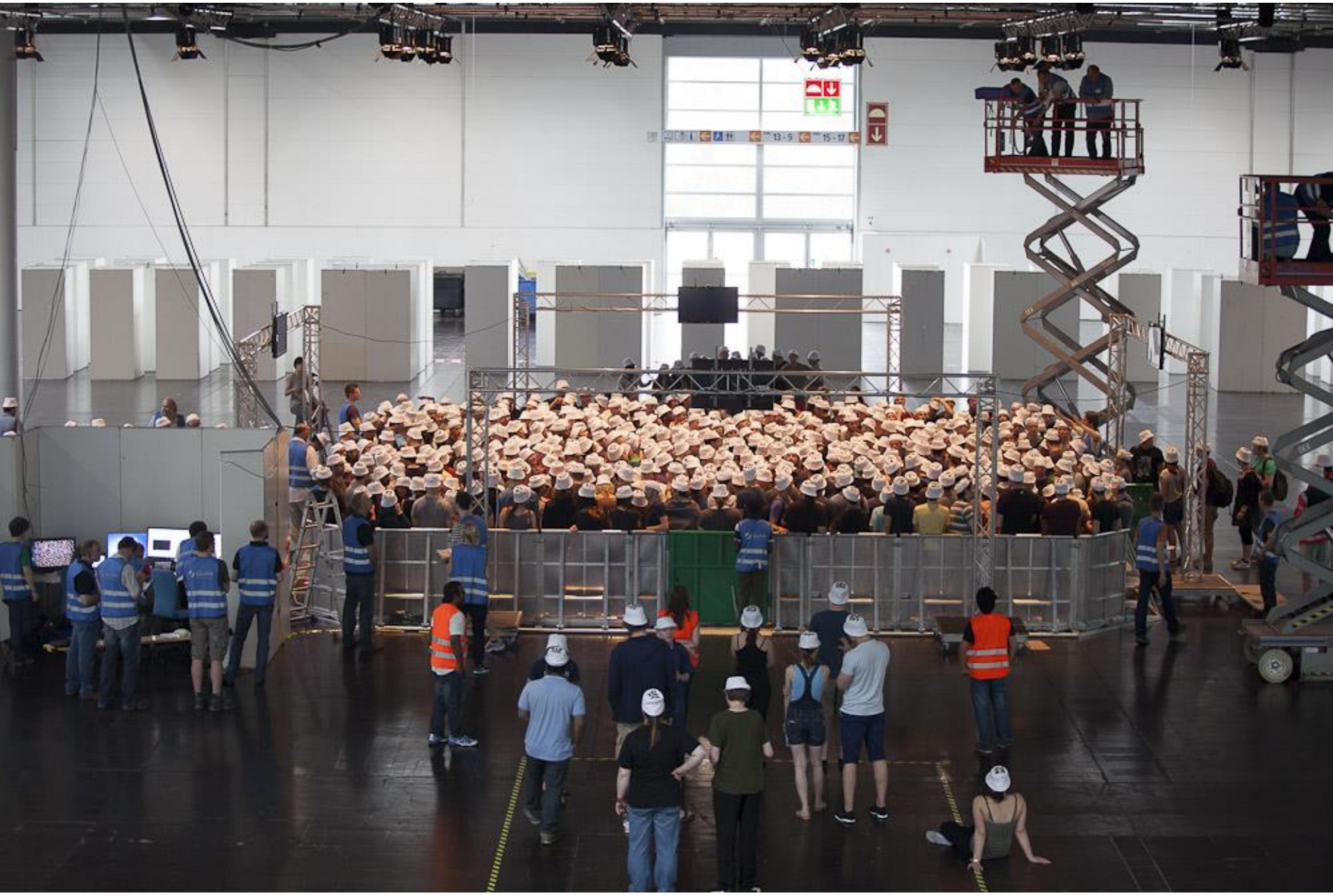
- BARRIER
  - Different densities in a closed area
  - Social cohesion
  - Distribution near exits



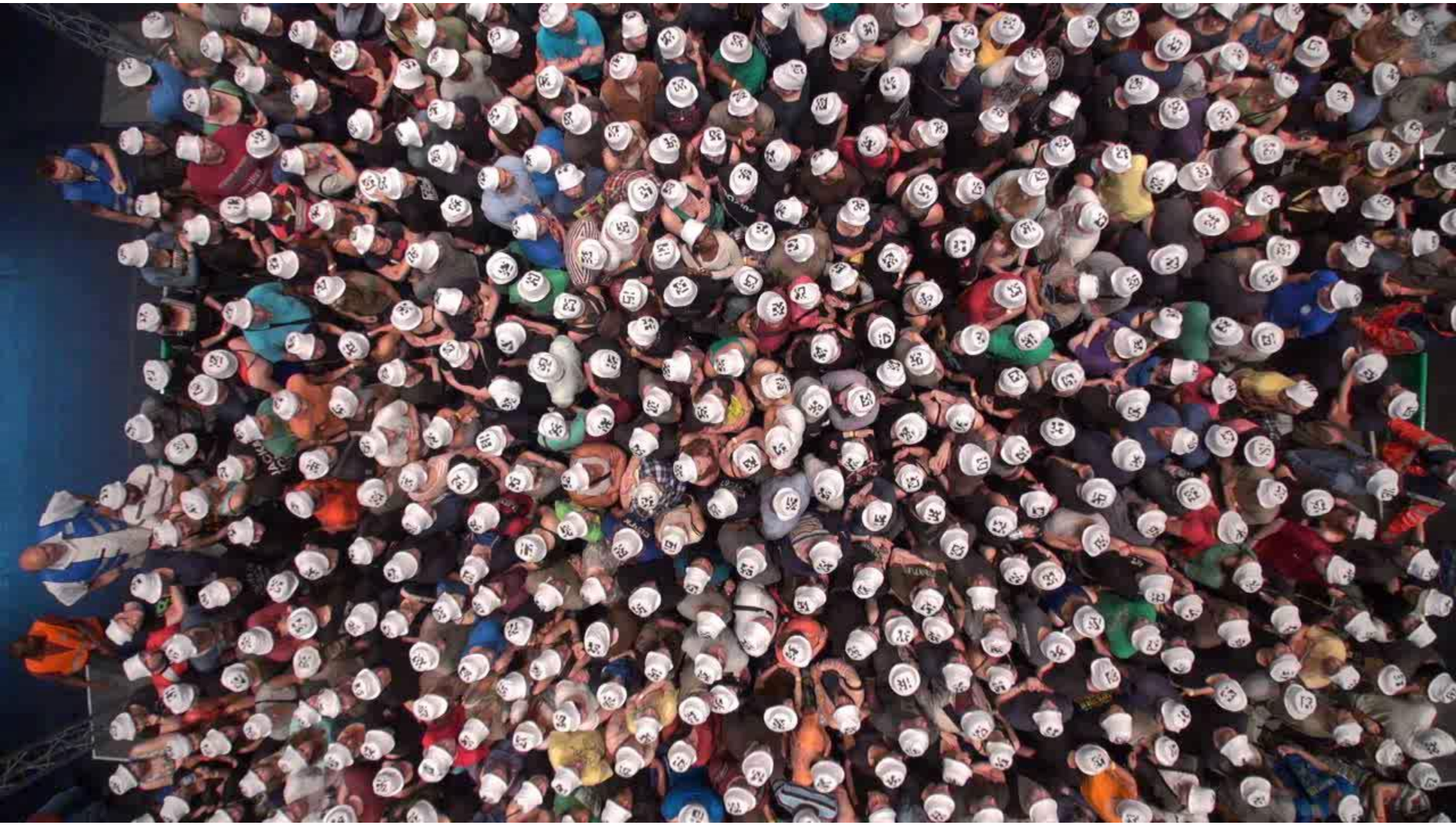
- CROSSING_90
  - 4 entrance and 2 streams
  - Influence of pillar and information signs



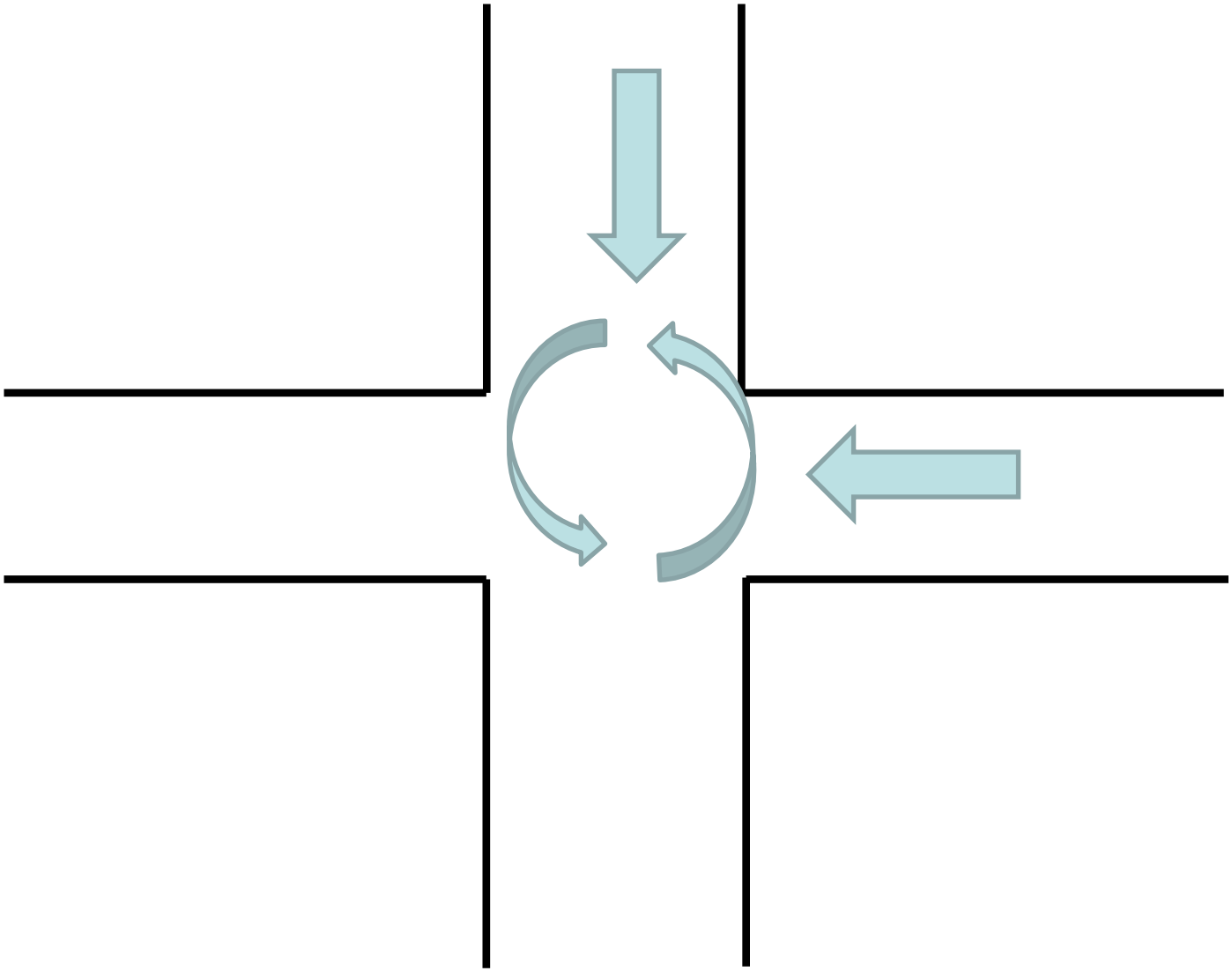
Barrier



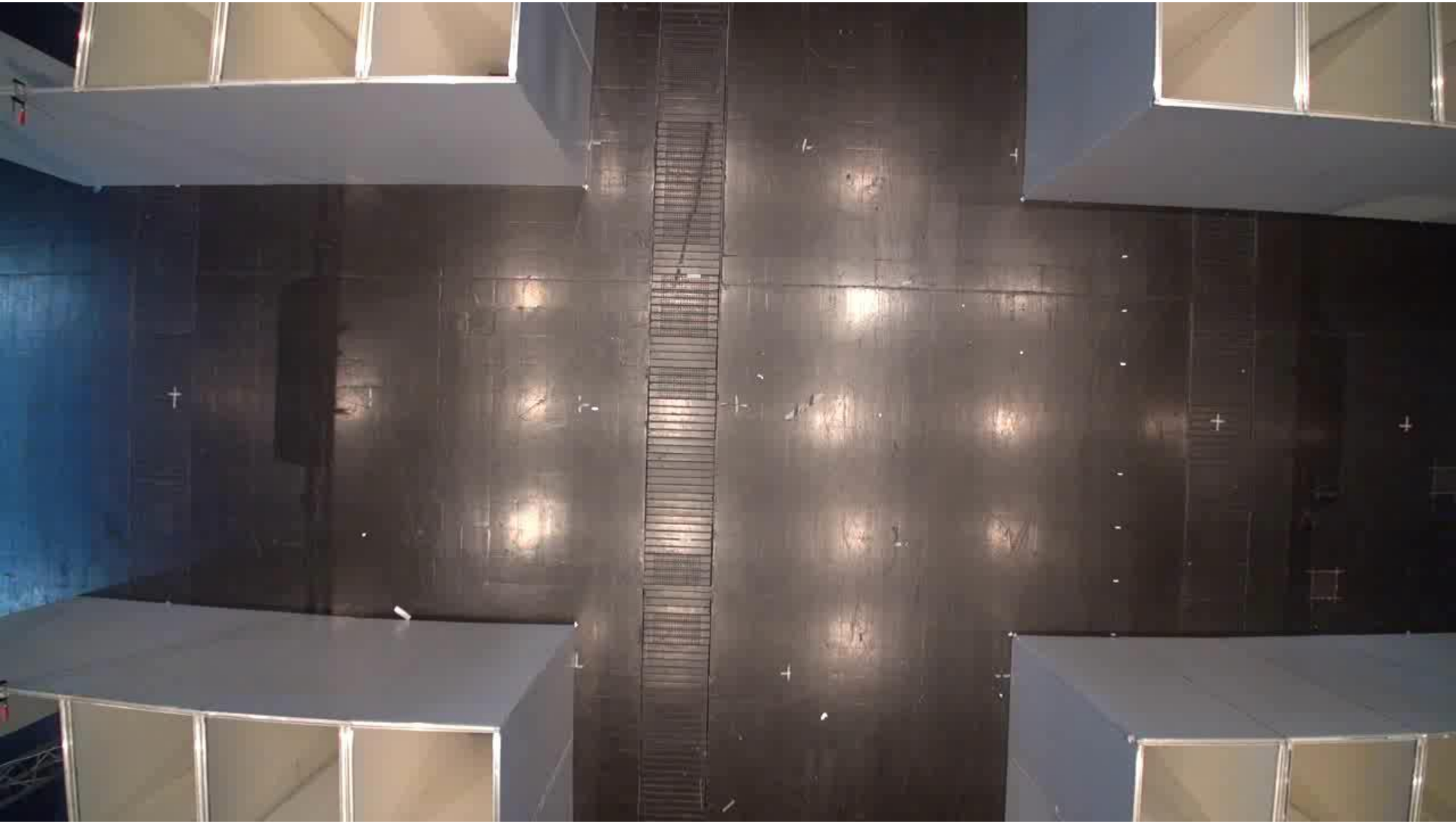
Barrier



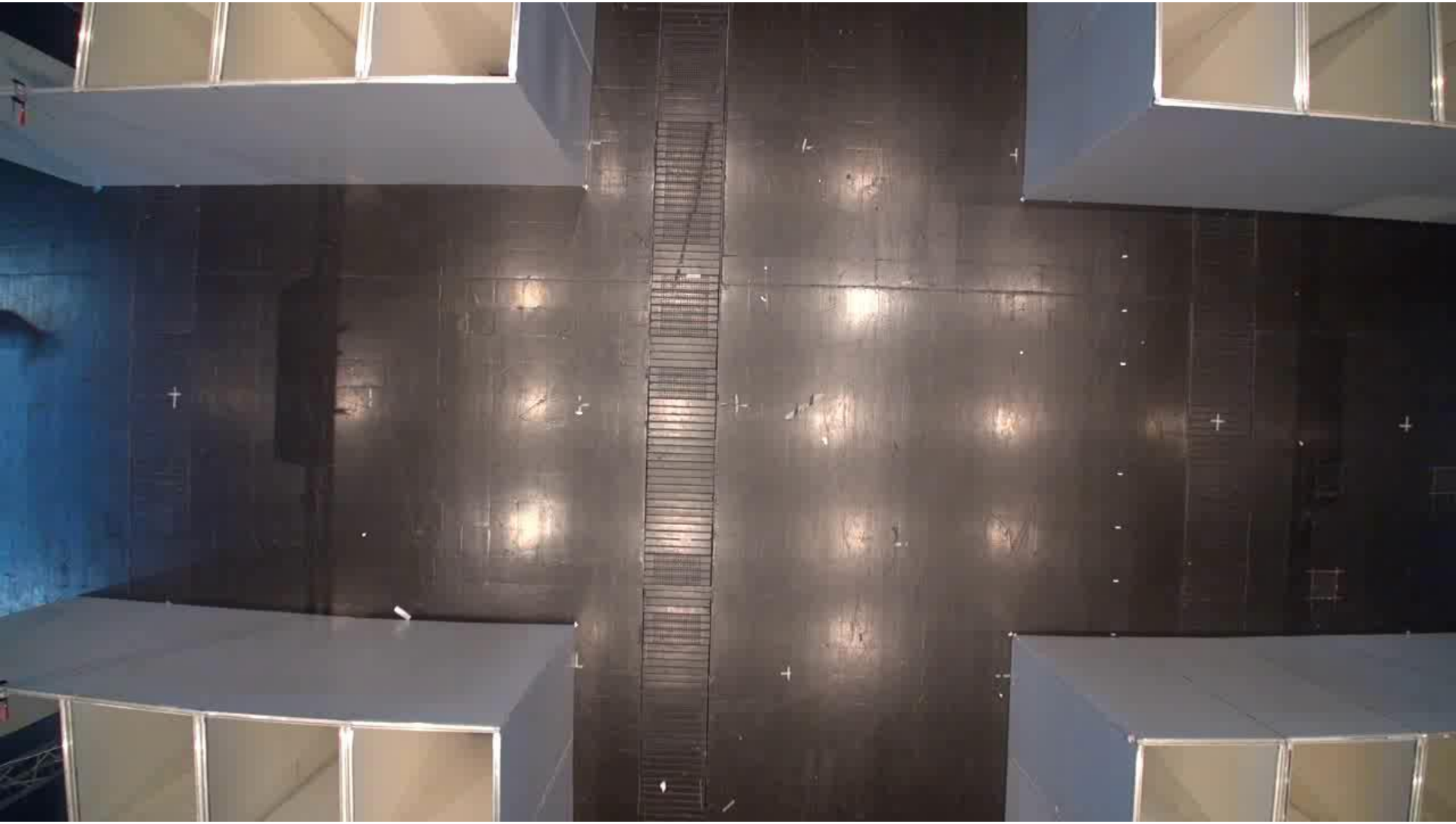
Crossing with two streams



Crossing with information sign



Crossing without information sign

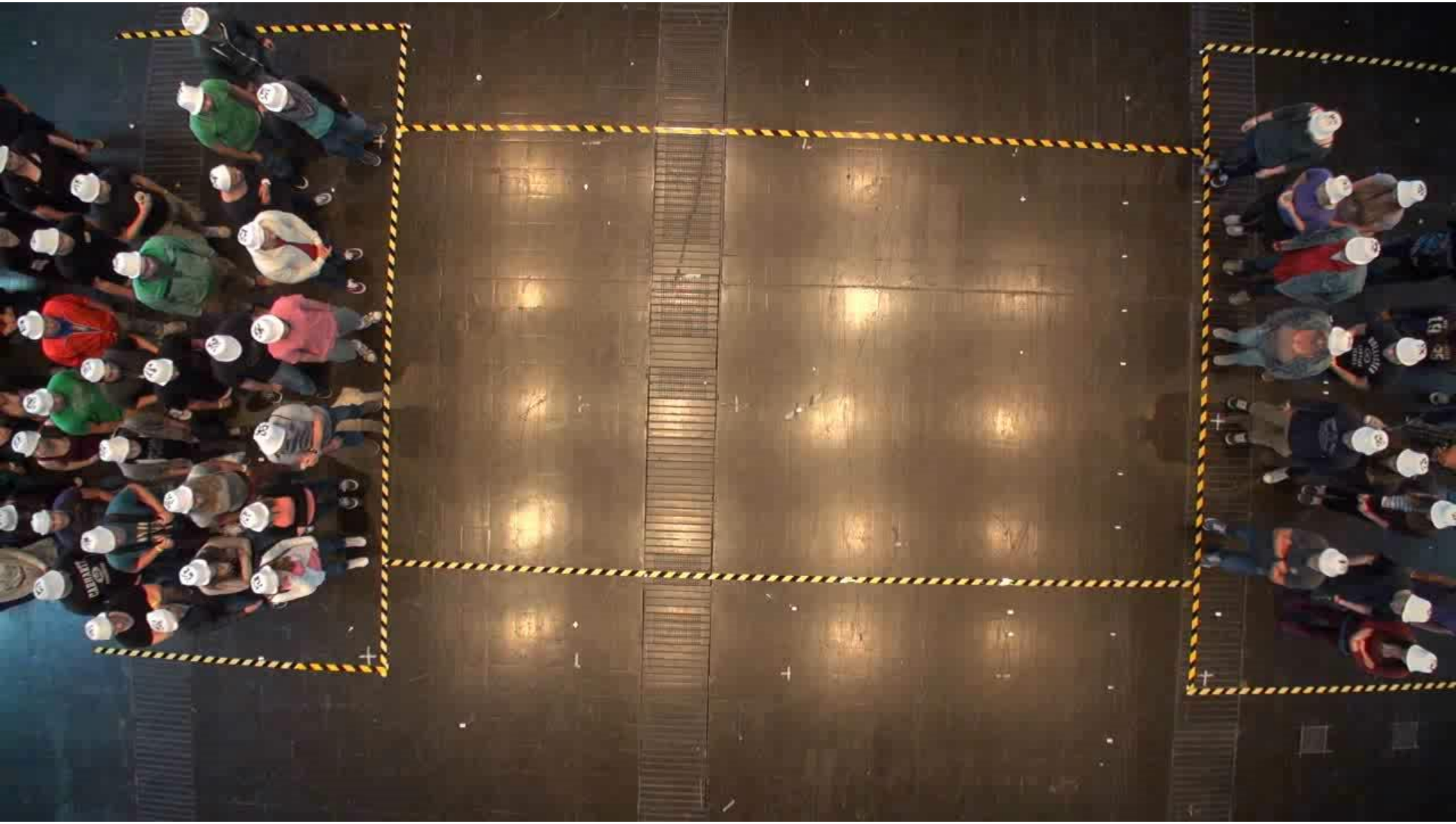


DAY 3

Day 3

- **Social effects**: How do social groups impact the evacuation time
- **Routing**: How do pedestrians choose between different exits.
- **Inflow process**: How do pedestrians scatter after entering a closed are?
- **Crosswalk**: Impact of groups of different sizes in bi-directional flow (asymmetric flow)
- **Pedestrian zone**: Collision avoidance in bi-directional flow
- **1D circle**: Stop-and-go waves
- **Queuing**: Reaction time in a queue

Crosswalk



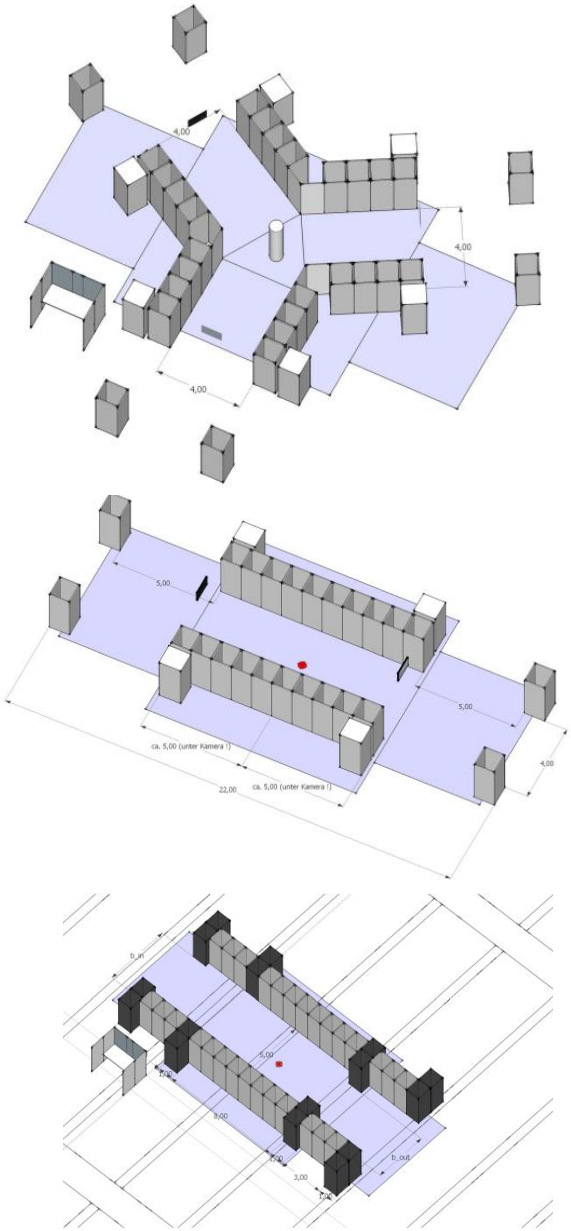
Phase-separation in 1D

Inflow process

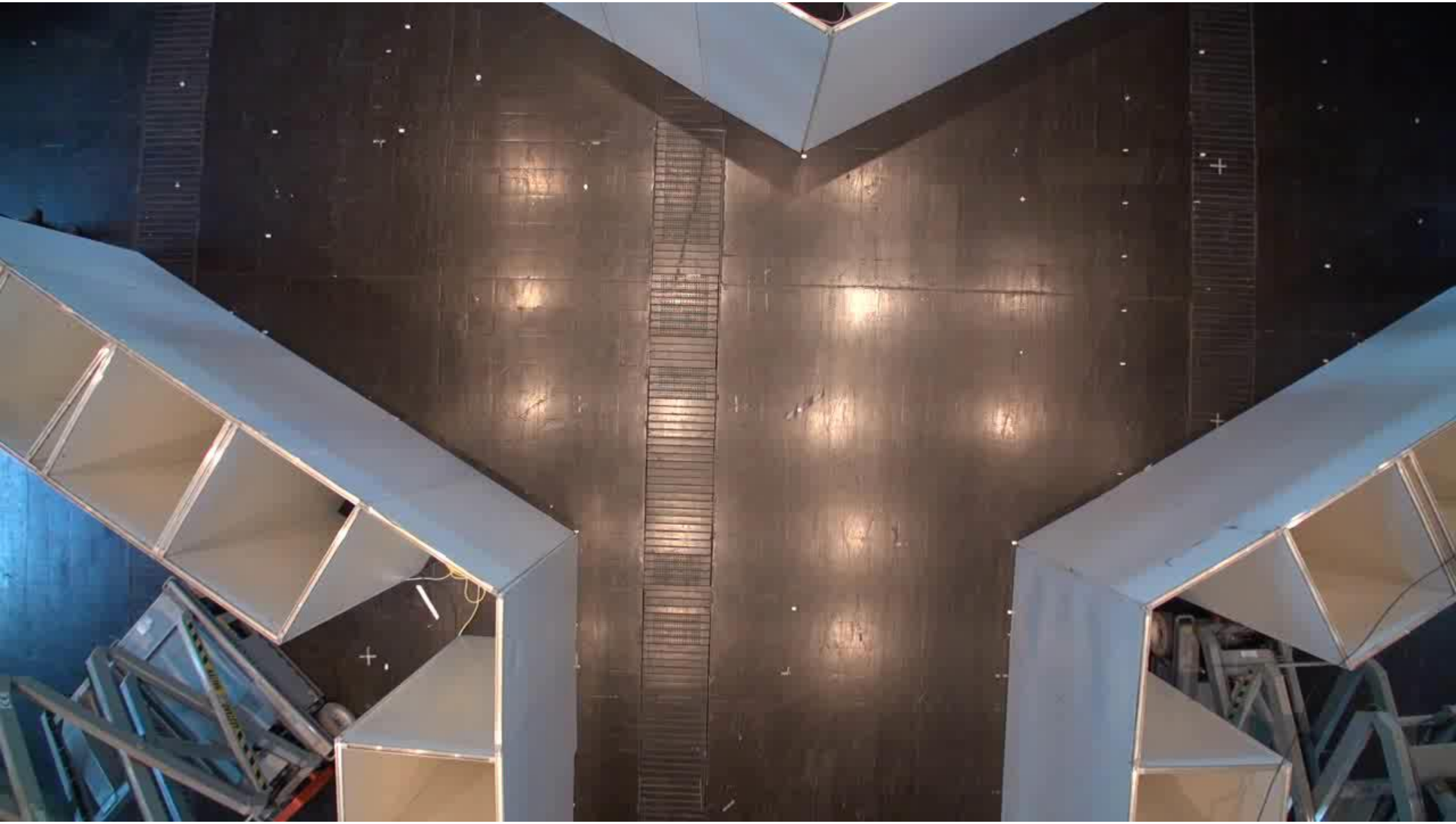
DAY 4

Day 4

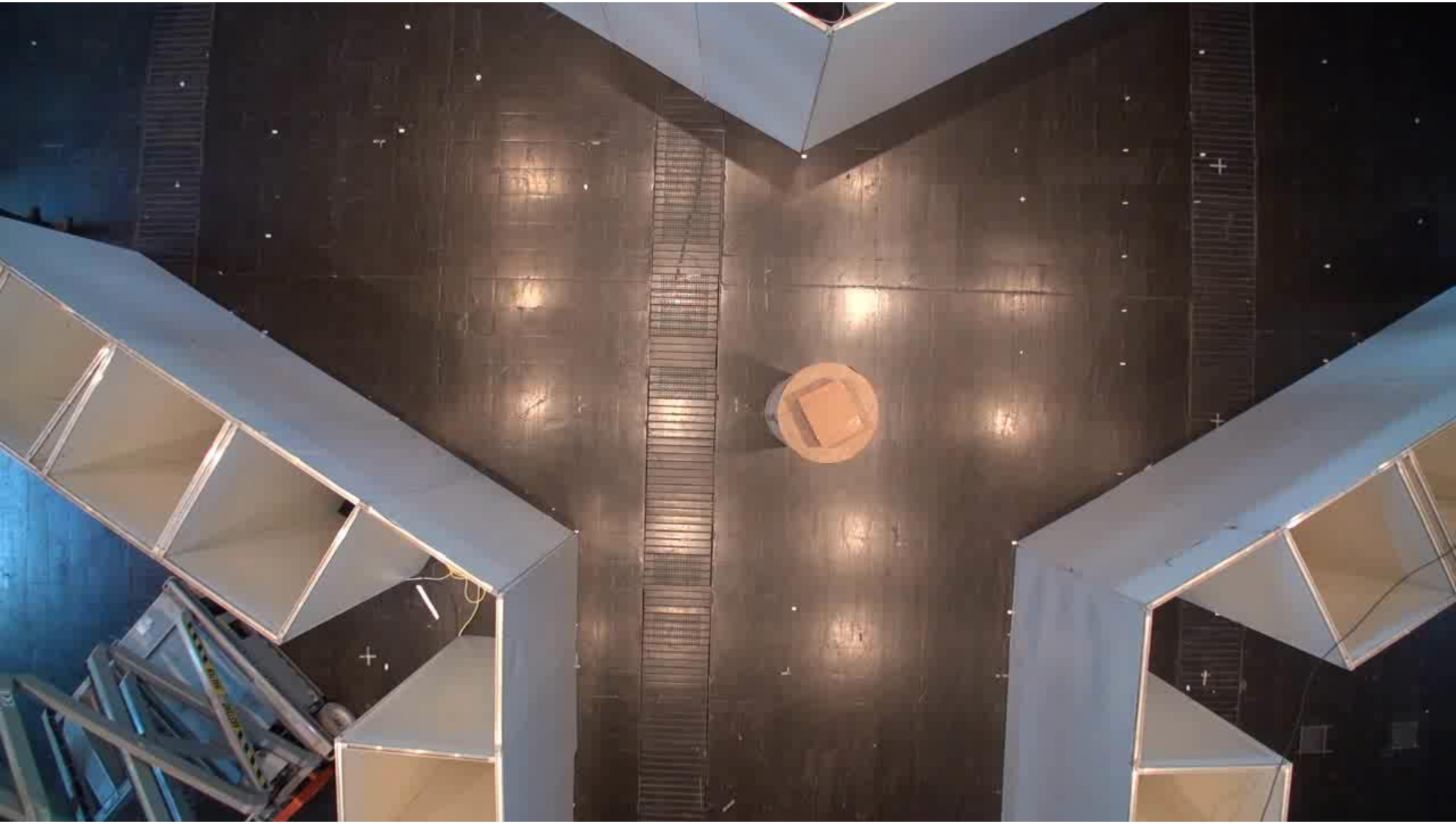
- CROSSING_120
  - 3 entrances
  - 3 streams
  - Influence of pillar and information signs.
- BI_CORR_400
  - Bi-directional flow
- UNI_CORR_500
  - Uni-directional flow



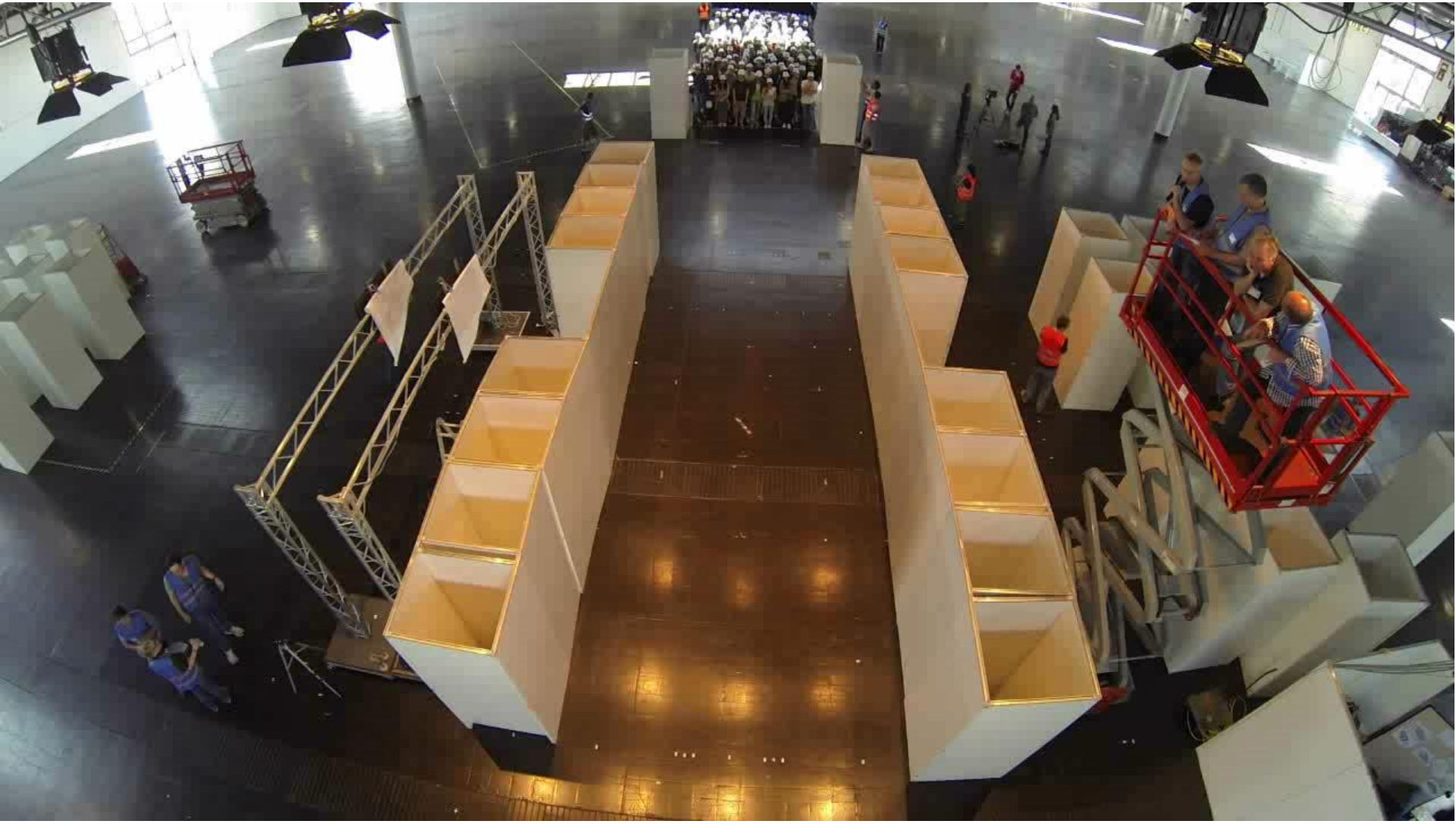
Crossing



Crossing with information pillar



Bi-directional flow



Outlook

- Trajectory-extraction from the videos (~8 TB data).
- Trajectory-matching
- Measurement of the fundamental diagram and flow
- Quantitative investigation of observed phenomena (jams, stop-and-go-waves, routing, social groups, perception, …)
- Model calibration and validation

Thank you for your attention!